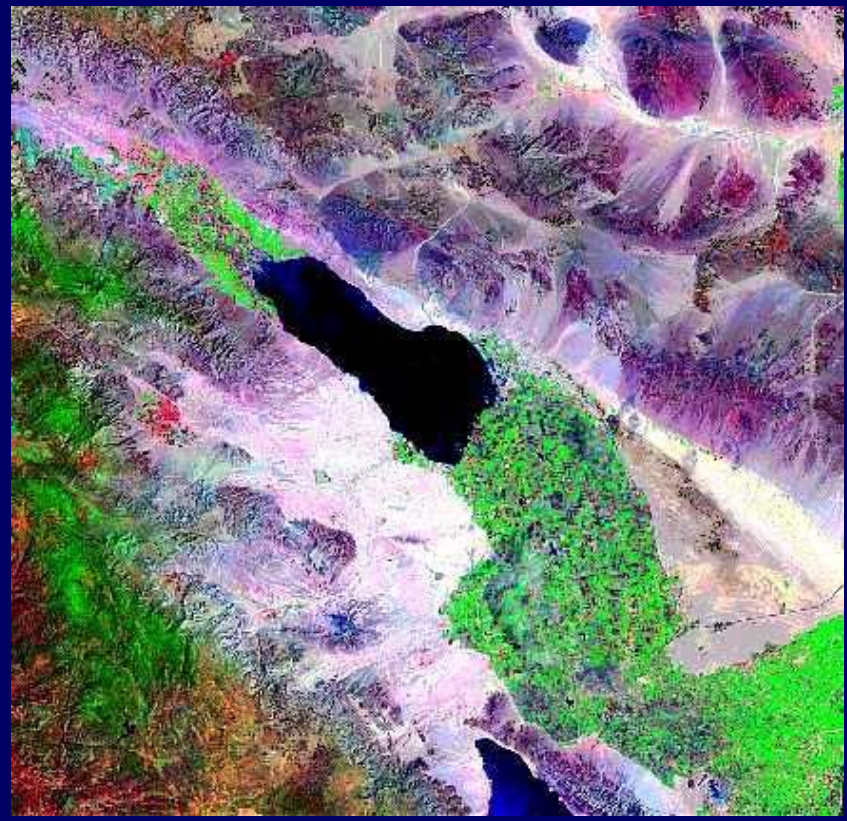
QSA Baseline (with QSA) Modeling at the Salton Sea

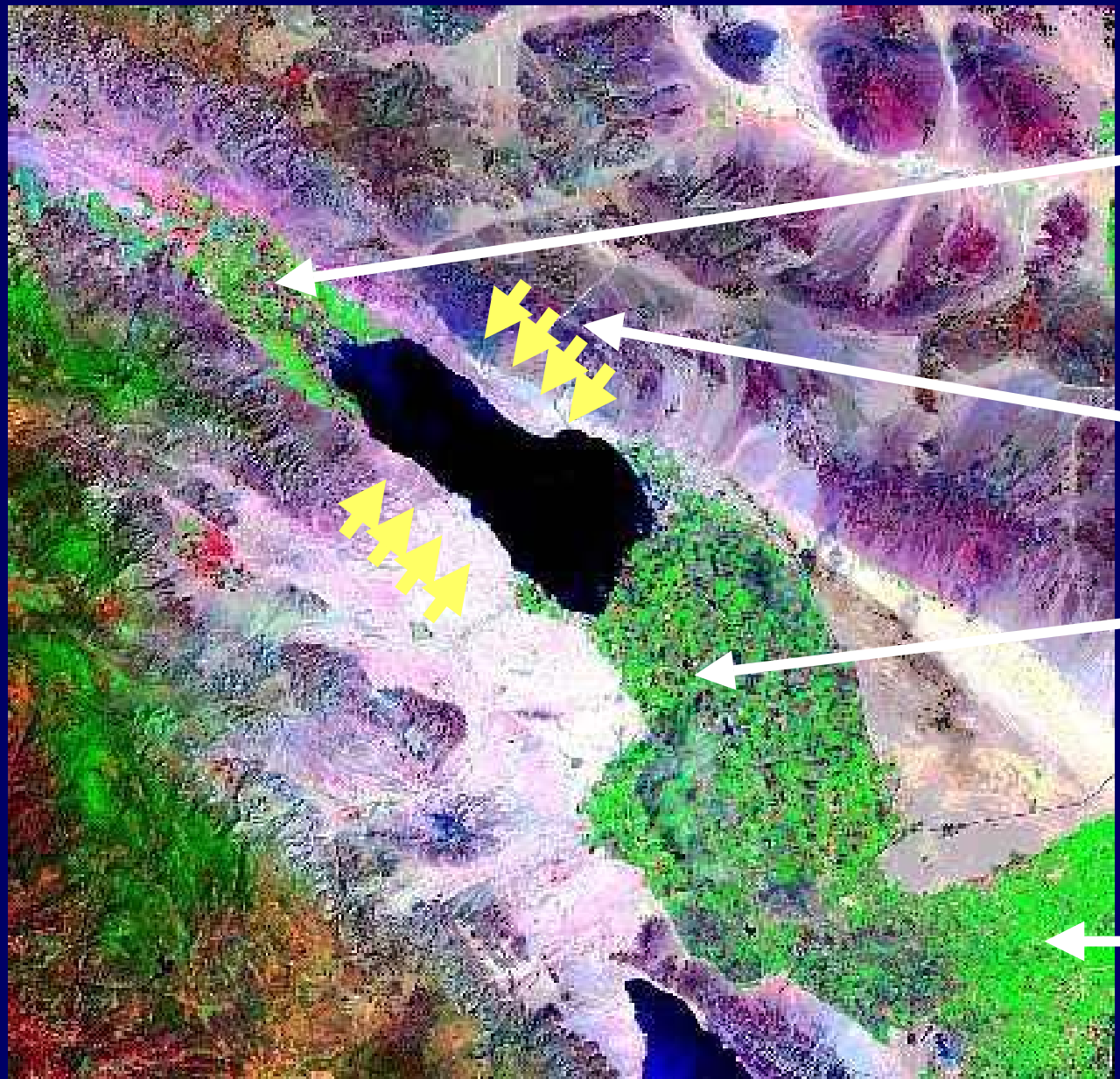


Paul A. Weghorst, PE
Bureau of Reclamation
June 8, 2004

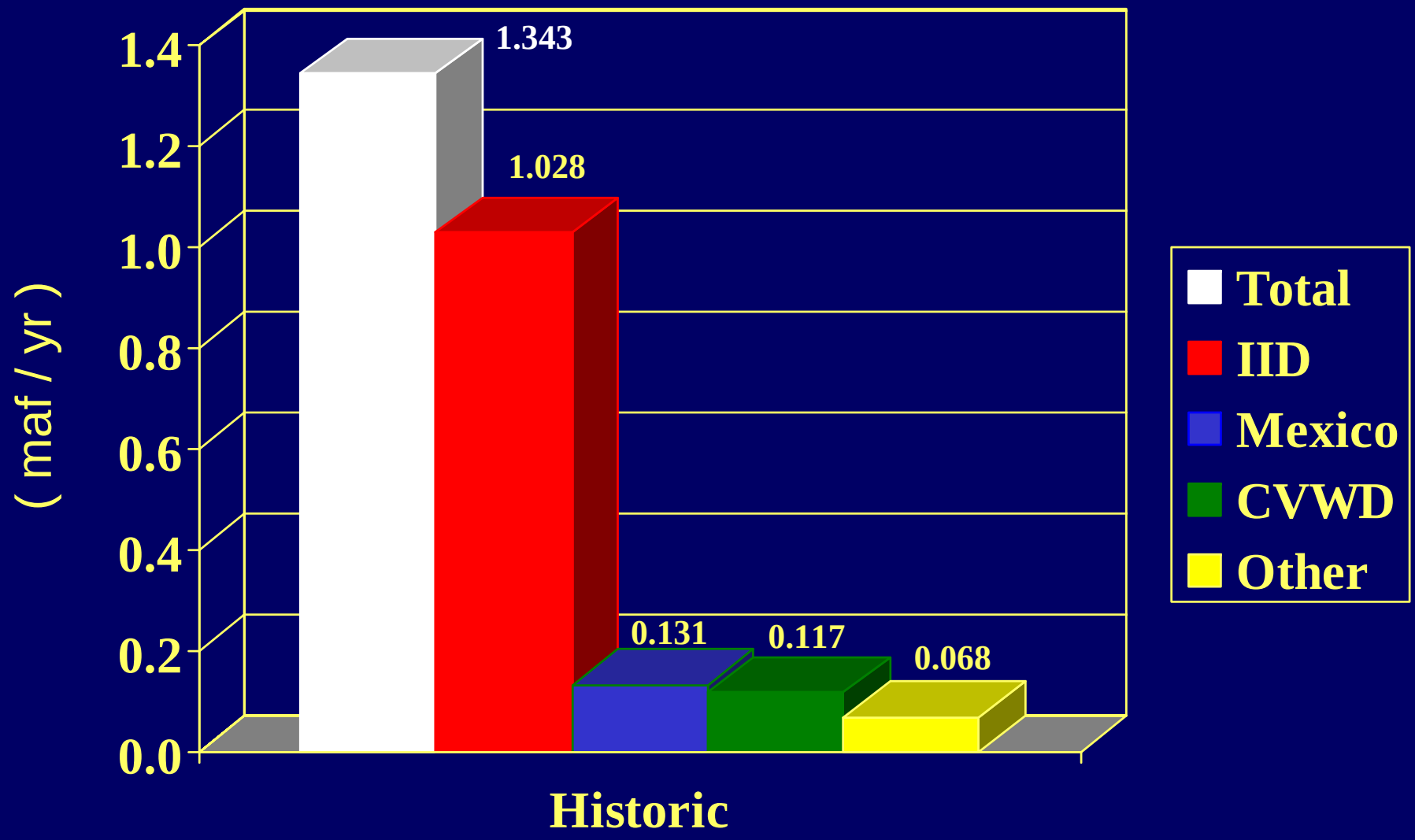
Presentation Overview

- Historic Salton Sea Inflows
- IID/SD Transfer Baseline Inflow Assumptions
  - Without transfer
- QSA Baseline Inflow Assumptions
  - With QSA
- Comparisons Between Transfer and QSA Baselines
- Assumptions for Possible Ecosystem Restoration Baseline

Primary Sources of Inflows



Historic Inflows



Development of the IID/SDCWA Transfer EIS/EIR Baseline

- Complex Computer Modeling
  - Colorado River Simulation System Model (CRSS)
  - Imperial Irrigation District Decision Support System (IIDSS)
  - Coachella Valley Water District Groundwater Model
  - Salton Sea Accounting Model (SSAM)

IID/SDCWA Transfer EIS/EIR Baseline Assumptions

- 1988 IID/MWD agreement
- Entitlement enforcement
- Reductions in inflow to the Salton Sea from CVWD
- Mexico contributions
- Increased salinity in Colorado River

1988 IID/MWD agreement

- Transfer of 110 kaf/yr to MWD
- Water conservation projects
  - Gradual ramp-up from 1990 to 1998
    - Full amount transferred starting in 1998
  - Reduction in inflow to the Salton Sea
    - 110 kaf/yr
  - Modeled in IIDSS

Entitlement Enforcement

- CVWD and IID diversions adjusted
  - 4.4 maf/yr California apportionment
- Reduction in combined diversion
  - 59.2 kaf/yr
- Reduction in inflow to Salton Sea
  - 56.9 kaf/yr
  - Modeled in IIDSS

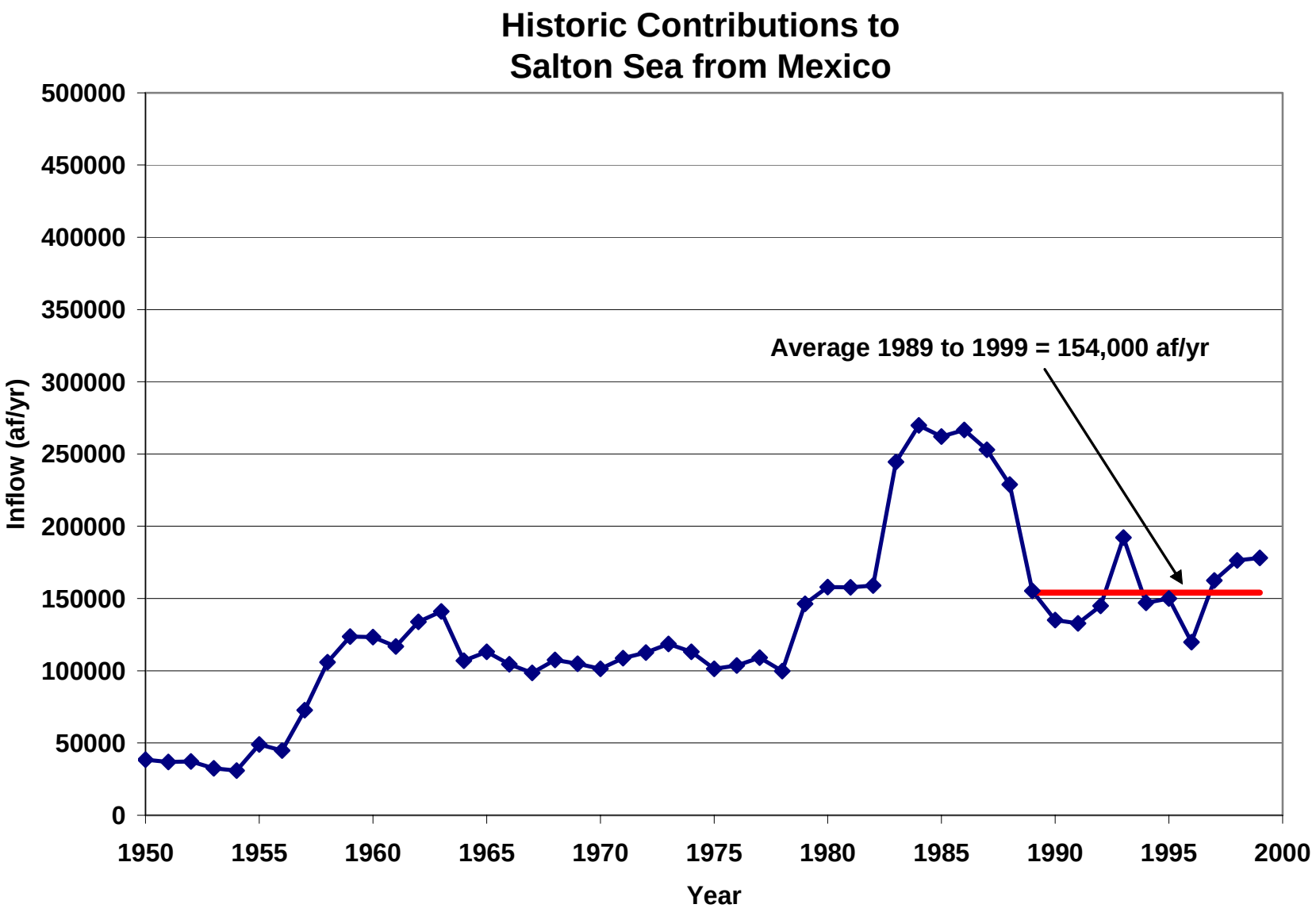
Reductions in inflow to the Salton Sea from CVWD

- Continued depletion of CVWD aquifer
  - Water table gradient from Salton Sea
  - Salton Sea water recharging the aquifer
  - 29 kaf/yr reduction in inflow to the Salton Sea
    - Slow decline over 75 years
  - Modeled in CVWD Groundwater Model

Mexico Contributions

- Same as in recent history
  - Average 1989 to 1999
- Plus 3 percent for increased salinity in Colorado River
- Modeled in SSAM

Historic Mexico Inflow Contributions



Increased Salinity in Colorado River

- Projected river salinity of 879 mg/l
  - At Imperial Dam
  - Increased from historic average
    - 747 mg/l (1987 to 1999)
    - Modeled in CRSS
- Increased leaching requirements in IID
  - Increases in inflow to the Salton Sea
  - Modeled in IIDSS

Baseline Statement by State Water Resources Control Board

- Order: WRO 2002-0013 relative to IID/SDCWA transfer
  - "…..the SWRCB finds that the baseline relied upon in the Final EIR/EIS is a reasonably accurate depiction of future conditions of the Salton Sea"

Salton Sea QSA Inflow Assumptions, if no Sea Restoration

- Based on QSA and Colorado River Water Delivery Agreement (Exhibit B)
  - Deliveries to SDCWA by Fallowing Until 2018
    - With Salton Sea salinity management water
  - Deliveries to SDCWA by Efficiency Conservation 2018 and Beyond
    - Salinity management water terminated
  - Deliveries to CVWD by Efficiency Conservation

Exhibit B – Colorado River Water Delivery Agreement

EXHIBIT B

QUANTIFICATION AND TRANSFERS[1]

In Thousands of Acre-feet

Column:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
			IID Priority 3a											CVWD Priority 3a									
				Reductions											Reductions			Additions					
	Calendar Year	[2]Priority 1, 2 and 3b	IID Priority 3a Quantified Amount	[3]IID Reduction: MWD 1988 Agreement Transfer	IID Reduction: SDCWA Transfer	[4]IID Reduction: AAC Lining IID, SDCWA & SLR	[5][6]IID Reduction: SDCWA Mitigation Transfer	[7]Intra-Priority 3 Transfer IID/CVWD	[8]IID Reduction: MWD Transfer with Salton Sea Restoration	[4]IID Reduction: Conditional ISG Backfill	[9]IID Reduction: Misc. PPRs	IID Reductions: Total Amount (sum of columns 4 through 11)	[10]IID Net Consumptive Use Amount (difference between column 3 and column 12)	CVWD Priority 3a Quantified Amount	[4]CVWD Reduction: CC Lining, SDCWA & SLR	[9]CVWD Reduction: Misc. PPRs	[11]CVWD Reductions: Total Amount (sum of columns 15 + 16)	[7]Intra-Priority 3 Transfer IID/CVWD	[7]Intra-Priority 3 Transfer MWD/CVWD	CVWD Net Consumptive Use Amount (columns 14 - 17 plus columns 18 + 19)	Total Priority 1-3 Use Plus PPR Consumptive Use (sum of columns 2+13+20 plus 11+16)	[12]ISG Benchmarks	[12]Annual Targets
1	2003	420	3,100	110	10	0	5	0	0	0	11.5	136.5	2,963.5	330	0	3	3	0	20	347	3,745.0	3,740	3,740
2	2004	420	3,100	110	20	0	10	0	0	0	11.5	151.5	2,948.5	330	0	3	3	0	20	347	3,730.0		3,707
3	2005	420	3,100	110	30	0	15	0	0	0	11.5	166.5	2,933.5	330	0	3	3	0	20	347	3,715.0		3,674
4	2006	420	3,100	110	40	0	20	0	0	9	11.5	190.5	2,909.5	330	26	3	29	0	20	321	3,665.0	3,640	3,640
5	2007	420	3,100	110	50	0	25	0	0	0	11.5	196.5	2,903.5	330	26	3	29	0	20	321	3,659.0		3,603
6	2008	420	3,100	110	60	67.7	25	4	20	0	11.5	288.2	2,811.8	330	26	3	29	4	20	325	3,571.3		3,566
7	2009	420	3,100	110	60	67.7	30	8	40	0	11.5	327.2	2,772.8	330	26	3	29	8	20	329	3,538.3	3,530	3,530
8	2010	420	3,100	110	70	67.7	35	12	60	0	11.5	366.2	2,733.8	330	26	3	29	12	20	333	3,501.3		3,510
9	2011	420	3,100	110	80	67.7	40	16	80	0	11.5	405.2	2,694.8	330	26	3	29	16	20	337	3,466.3		3,490
10	2012	420	3,100	110	90	67.7	45	21	100	0	11.5	445.2	2,654.8	330	26	3	29	21	20	342	3,431.3	3,470	3,470
11	2013	420	3,100	110	100	67.7	70	26	100	0	11.5	485.2	2,614.8	330	26	3	29	26	20	347	3,396.3		3,462
12	2014	420	3,100	110	100	67.7	90	31	100	0	11.5	510.2	2,589.8	330	26	3	29	31	20	352	3,378.3		3,455
13	2015	420	3,100	110	100	67.7	110	36	100	0	11.5	535.2	2,564.8	330	26	3	29	36	20	357	3,356.3		3,448
14	2016	420	3,100	110	100	67.7	130	41	100	0	11.5	560.2	2,539.8	330	26	3	29	41	20	362	3,336.3		3,440
15	2017	420	3,100	110	100	67.7	150	45	91	0	11.5	575.2	2,524.8	330	26	3	29	45	20	366	3,325.3		
16	2018	420	3,100	110	130	67.7	0	63	0	0	11.5	382.2	2,717.8	330	26	3	29	63	20	384	3,536.3		
17	2019	420	3,100	110	160	67.7	0	68	0	0	11.5	417.2	2,682.8	330	26	3	29	68	20	389	3,506.3		
18	2020	420	3,100	110	193	67.7	0	73	0	0	11.5	454.7	2,645.3	330	26	3	29	73	20	394	3,473.8		
19	2021	420	3,100	110	206	67.7	0	78	0	0	11.5	472.2	2,627.8	330	26	3	29	78	20	399	3,461.3		
20	2022	420	3,100	110	203	67.7	0	83	0	0	11.5	474.7	2,625.3	330	26	3	29	83	20	404	3,463.8		
21	2023	420	3,100	110	200	67.7	0	88	0	0	11.5	477.2	2,622.8	330	26	3	29	88	20	409	3,466.3		
22	2024	420	3,100	110	200	67.7	0	93	0	0	11.5	482.2	2,617.8	330	26	3	29	93	20	414	3,466.3		
23	2025	420	3,100	110	200	67.7	0	98	0	0	11.5	487.2	2,612.8	330	26	3	29	98	20	419	3,466.3		
24	2026	420	3,100	110	200	67.7	0	103	0	0	11.5	492.2	2,607.8	330	26	3	29	103	20	424	3,466.3		
25	2027	420	3,100	110	200	67.7	0	103	0	0	11.5	492.2	2,607.8	330	26	3	29	103	20	424	3,466.3		
26	2028	420	3,100	110	200	67.7	0	103	0	0	11.5	492.2	2,607.8	330	26	3	29	103	20	424	3,466.3		
	2029-2037	420	3,100	110	200	67.7	0	103	0	0	11.5	492.2	2,607.8	330	26	3	29	103	20	424	3,466.3		
	2038-2047[13]	420	3,100	110	200	67.7	0	103	0	0	11.5	492.2	2,607.8	330	26	3	29	103	20	424	3,466.3		
	2048-2077[14]	420	3,100	110	200	67.7	0	100	0	0	11.5	489.2	2,610.8	330	26	3	29	100	20	421	3,466.3		

[1] Exhibit B is independent of increases and reductions as allowed under the Inadvertent Overrun and Payback Policy.

[2] Any higher use covered by MWD, any lesser use will produce water for MWD and help satisfy ISG Benchmarks and Annual Targets.

[3] IID/MWD 1988 Conservation Program conserves up to 110,000 AFY and the amount is based upon periodic verification. Of amount conserved, up to 20,000 AFY to CVWD (column 19), which does not count toward ISG Benchmarks and Annual Targets, and remainder to MWD.

[4] Ramp-up amounts may vary based upon construction progress, and final amounts will be determined by the Secretary pursuant to the Allocation Agreement.

[5] Any amount identified in Exhibit B for mitigation purposes will only be from non-Colorado River sources and these amounts may be provided by exchange for Colorado River water.

[6] Water would be transferred to MWD subject to satisfaction of certain conditions and to appropriate federal approvals. For informational purposes only, these transfers may also be subject to state approvals. Schedules are subject to adjustments with mutual consent. After 2026, these quantities will count toward the ISG Benchmarks (column 22) and Annual Targets (column 23) only if and to the extent that water is transferred into the Colorado River Aqueduct for use by MWD and/or SDCWA.

[7] MWD can acquire if CVWD declines the water. Any water obtained by MWD will be counted as additional agricultural reduction to help satisfy the ISG Benchmarks and Annual Targets. MWD will provide CVWD 50,000 AFY of the 100,000 AFY starting in year 46.

[8] IID has agreed to provide transfer amounts to meet the minimum ISG benchmarks, not to exceed a cumulative total of 145,000 AF. Maximum transfer amounts are 25,000 AF in 2005, 50,000 AF plus the unused amount from 2006 in 2009, and 70,000 AF plus the unused amounts from 2008 and 2009 in 2012. In addition to the maximum transfer amounts IID has also committed that no more than 72,500 AF of reduced inflow to the Salton Sea would result from these additional transfers.

[9] Up to the amount shown, as agreed upon reduction to IID or CVWD to cover collectively the sum of individual Miscellaneous PPRs, federal reserved rights and decreed rights. This is a reduction that counts towards ISG Benchmarks and Annual Targets.

[10] For purposes of Subparagraph 8(b)(2)(i) and (ii) and 8(a)(1) and (4) the Secretary will take into account: (i) the satisfaction of necessary conditions to certain transfers (columns 7 and 9) not within IID's control; (ii) the amounts of conserved water as determined, where such amounts may vary (columns 4, 6, 9 and 10); and (iii) with respect to column 7, reductions by IID will be considered in determining IID's compliance regardless of whether the conserved water is diverted into the Colorado River Aqueduct.

[11] For purposes of Subparagraph 8(c)(1) and (4) the Secretary will take into account: (i) the satisfaction of necessary conditions to certain transfers (columns 15 and 16) not within CVWD's control; and (ii) the amounts of conserved water as determined, where such amounts may vary (column 15).

[12] All consumptive use of priorities 1 through 3 plus 14,500 AF of PPRs must be within 25,000 AF of the amount stated.

[13] Assumes SDCWA does not elect termination in year 35.

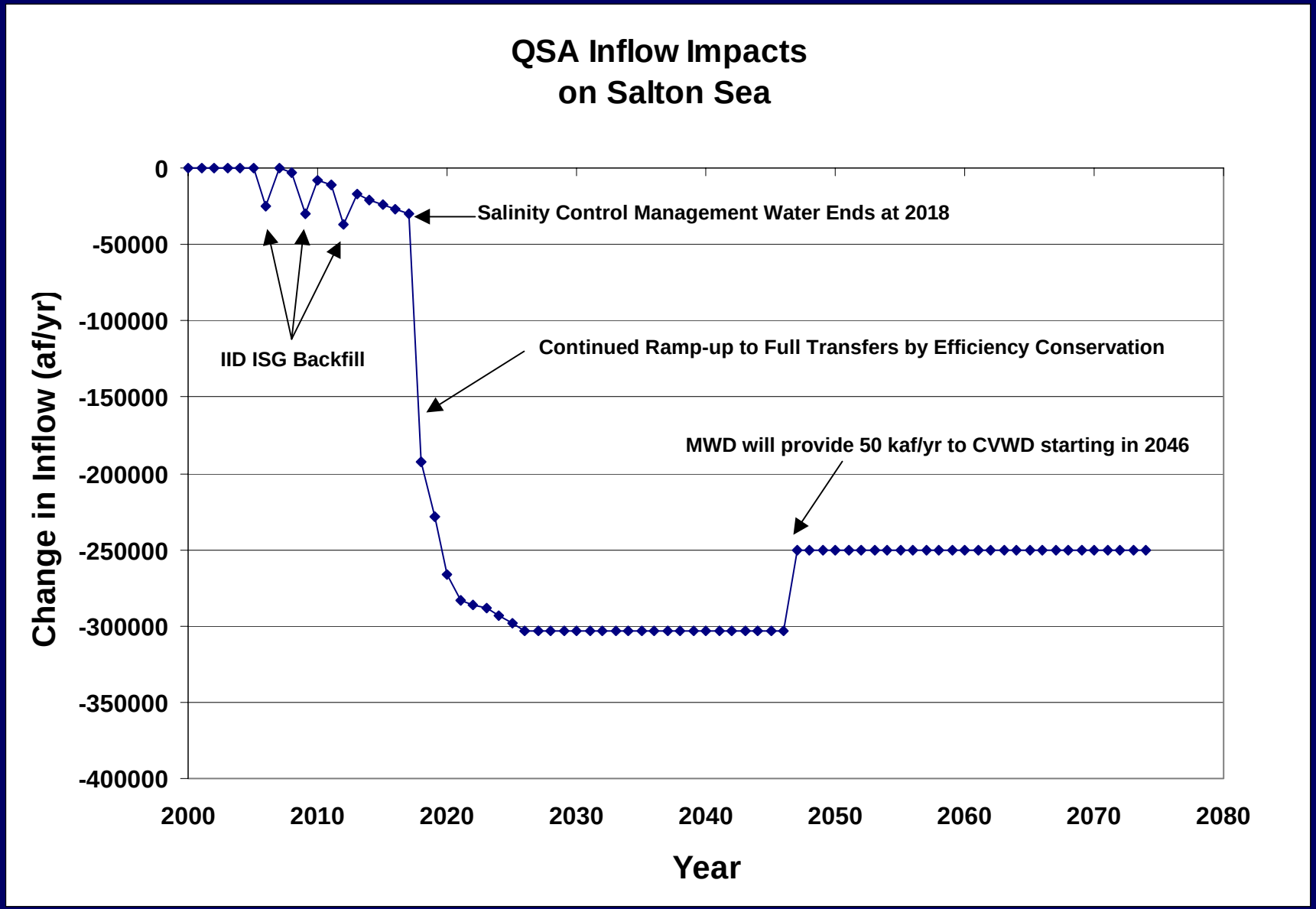
[14] Assumes SDCWA and IID mutually consent to renewal term of 30 years.

Notes:

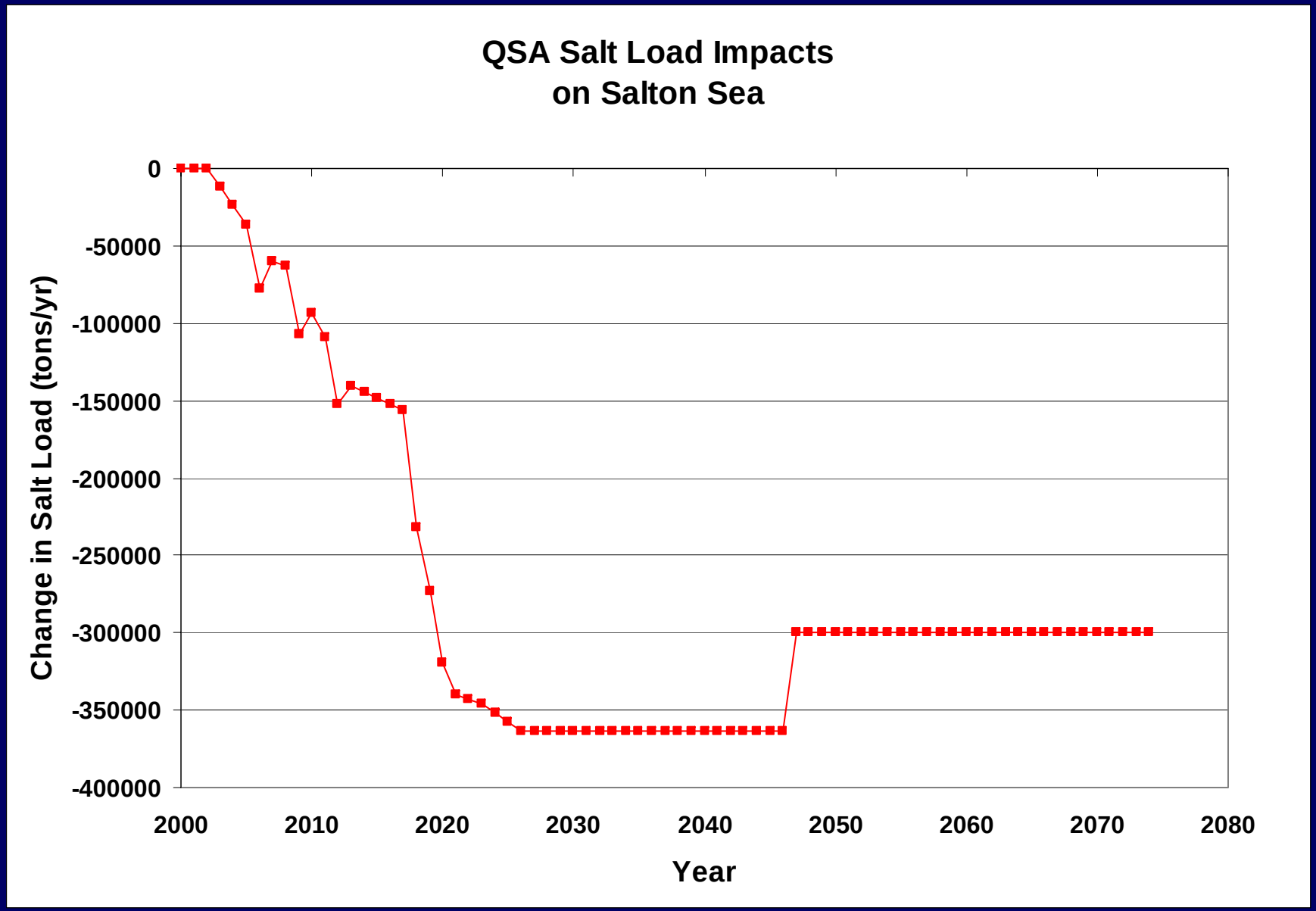
Substitute transfers can be made provided the total volume of water to be transferred remains equal or greater than amounts shown consistent with applicable federal approvals.

The shaded columns represent amounts of water that may vary.

QSA Impacts to Salton Sea Inflow



QSA Impacts to Salton Sea Salt Load

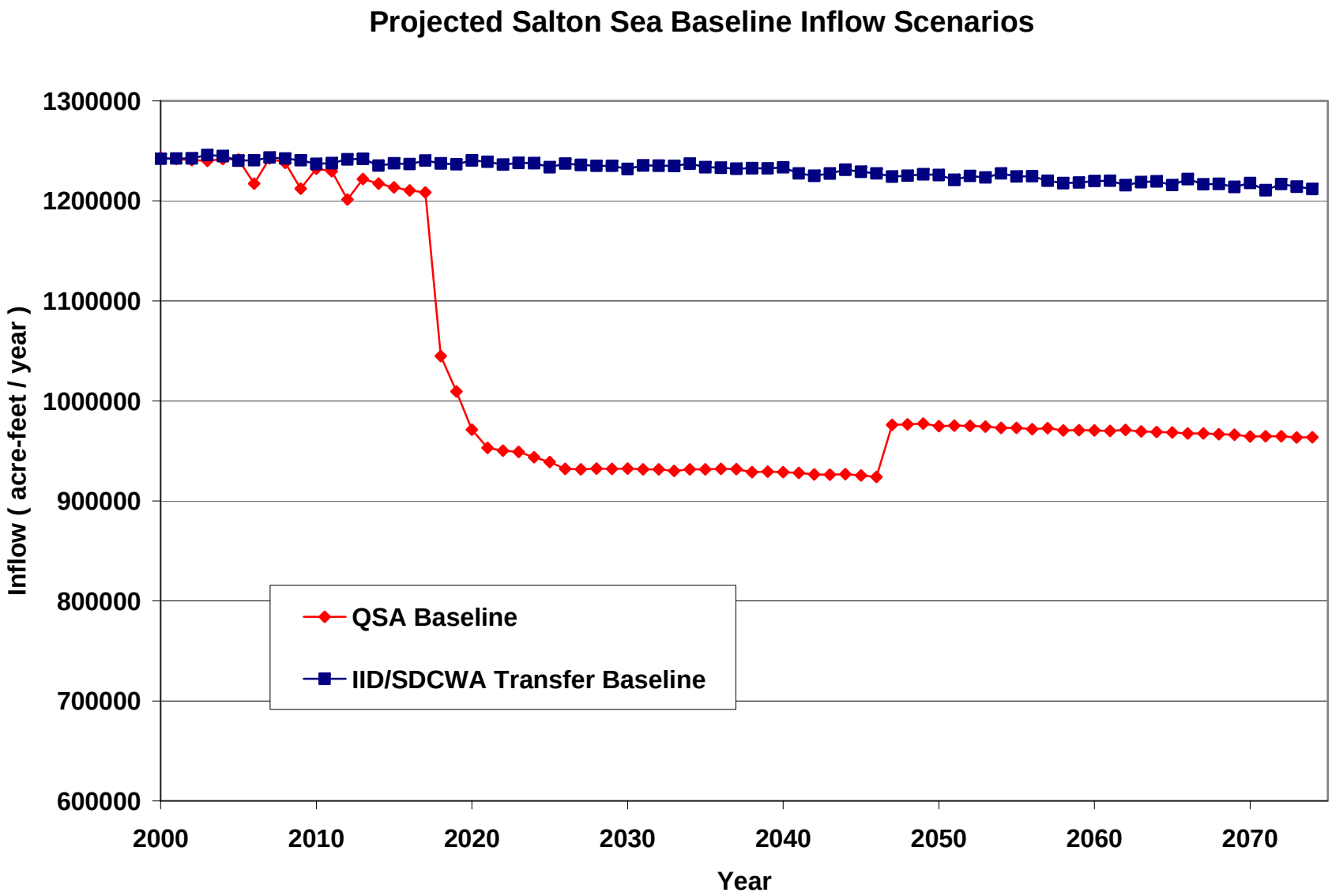


Comparisons Between IID/SDCWA Transfer and QSA Baselines

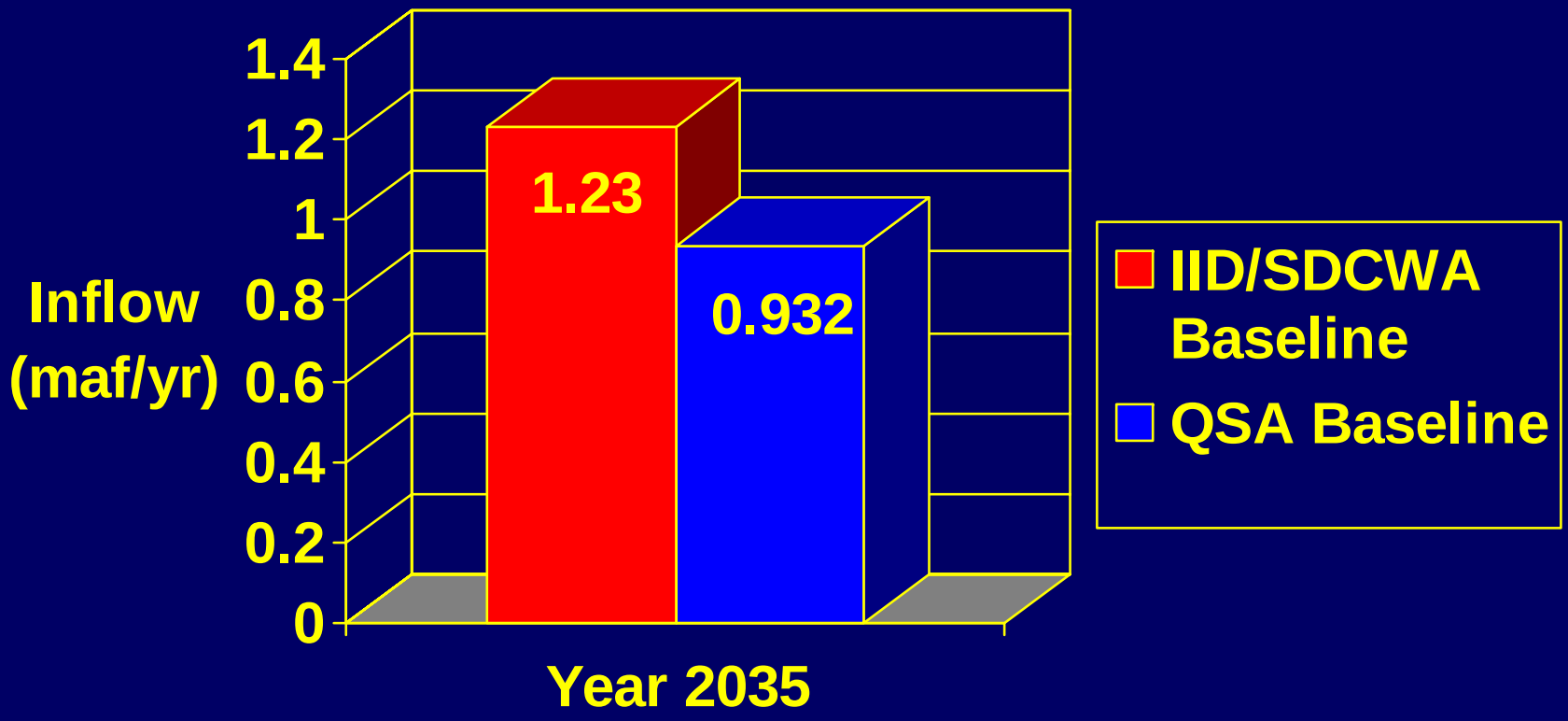
- Future Inflows Through time
- Inflows in year 2035
- Future Salton Sea
  - Salinity
  - Water Surface Elevation
  - Water Surface Area
- GIS depictions of minimum water surfaces

Future Salton Sea Baseline Inflows

(Mean Stochastic Simulation Results)

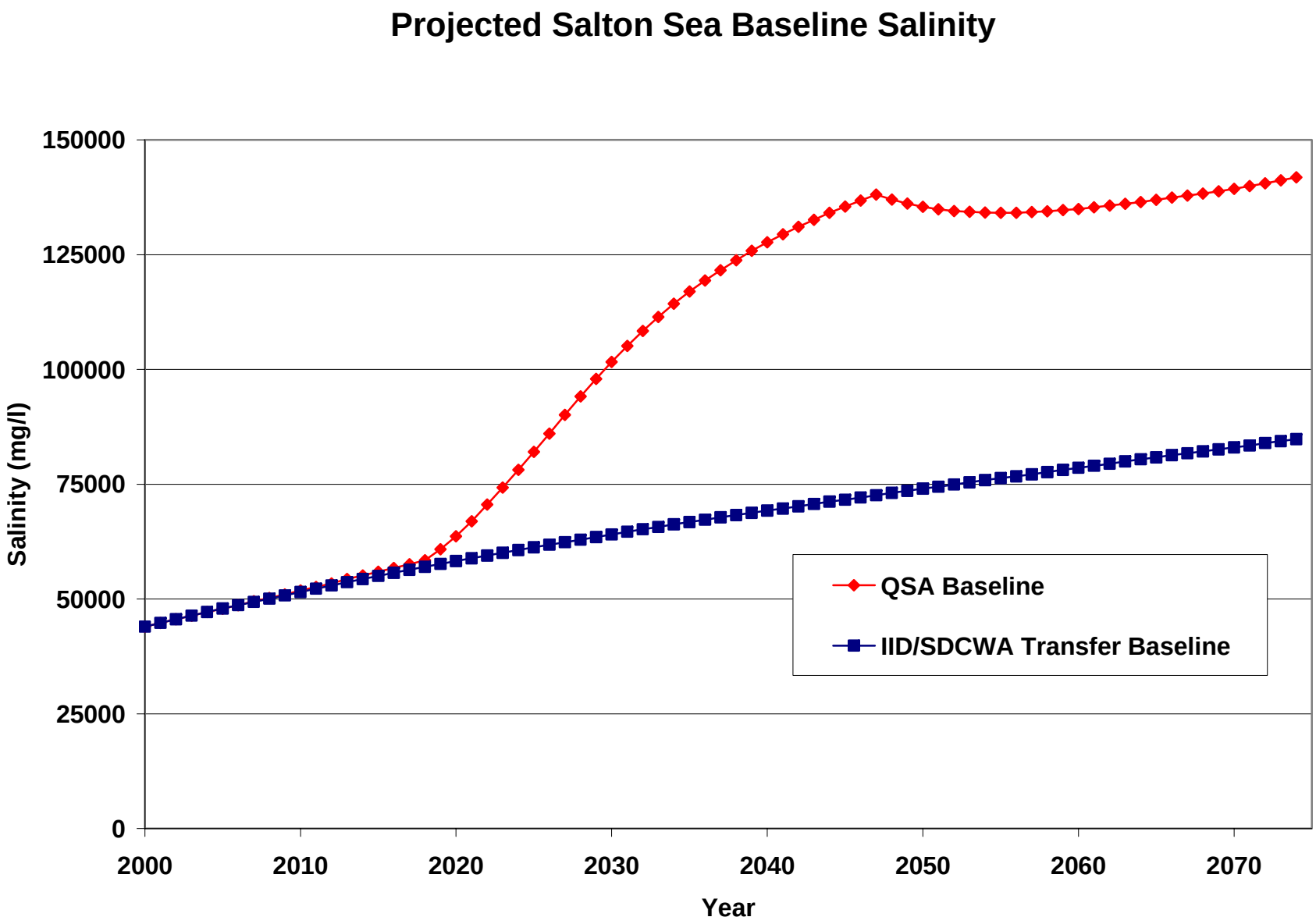


Salton Sea Baseline Inflows in 2035



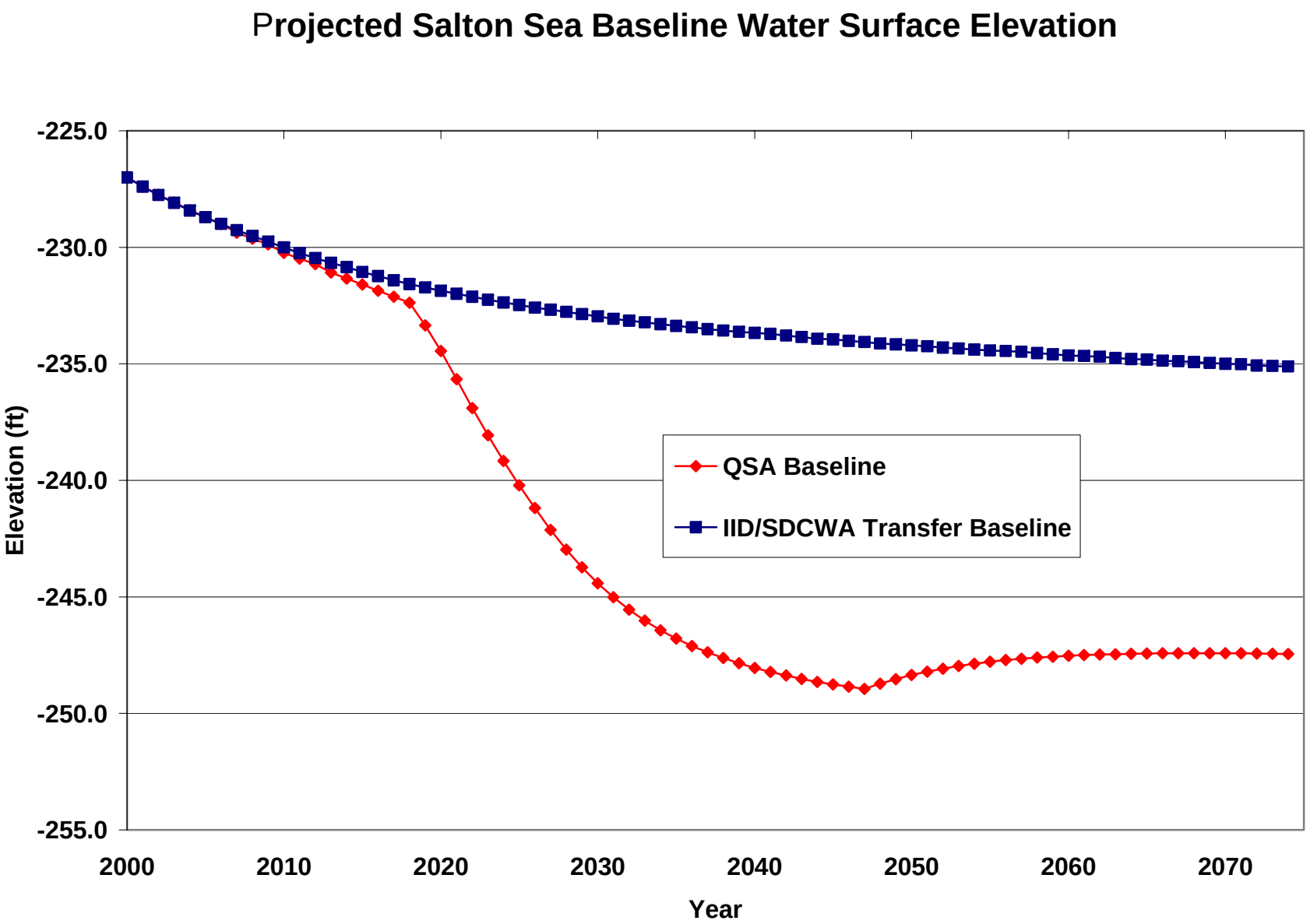
Future Salton Sea Baseline Salinity

(Mean Stochastic Simulation Results)



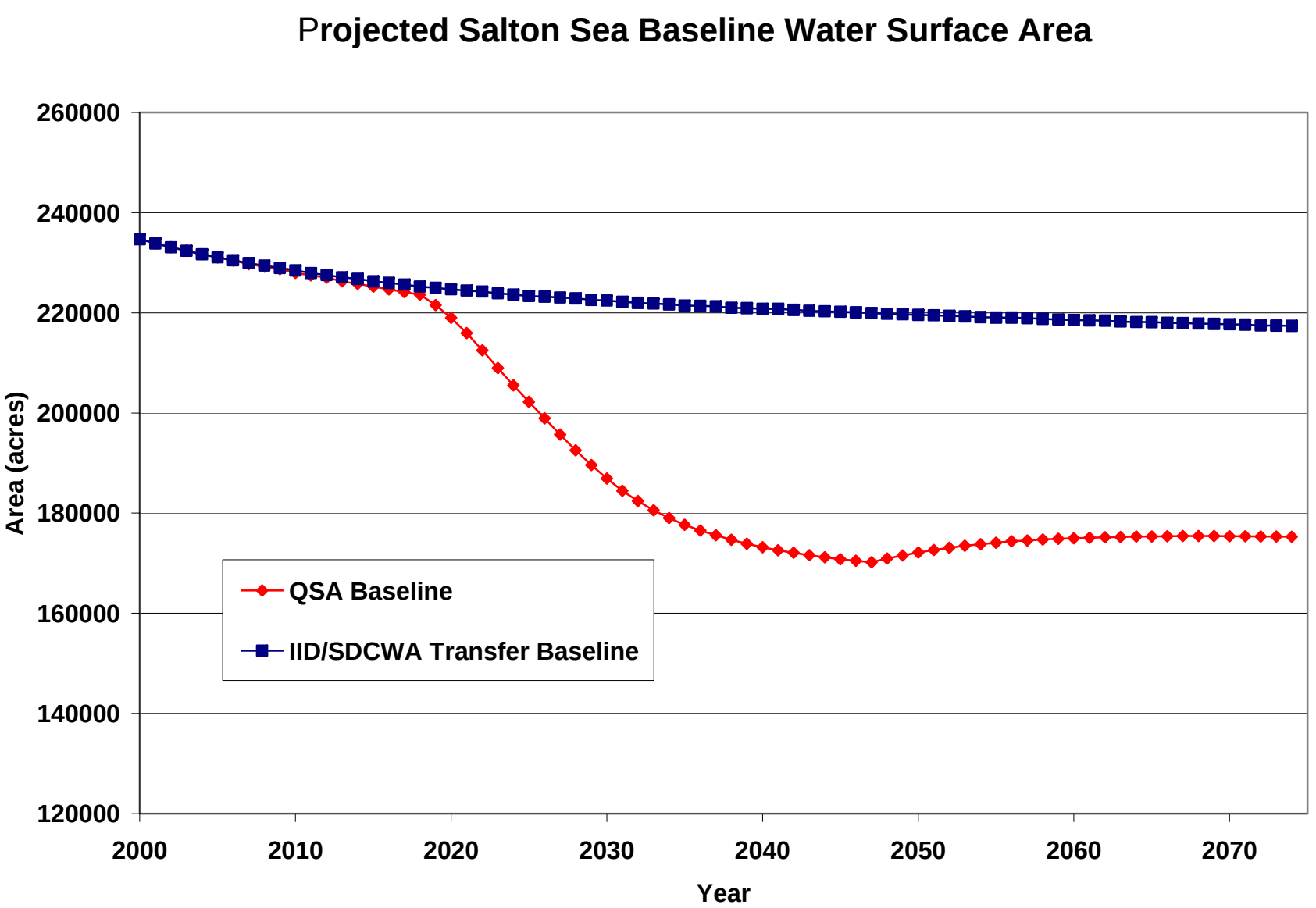
Future Salton Sea Baseline Water Surface Elevation

(Mean Stochastic Simulation Results)



Future Salton Sea Baseline Water Surface Area

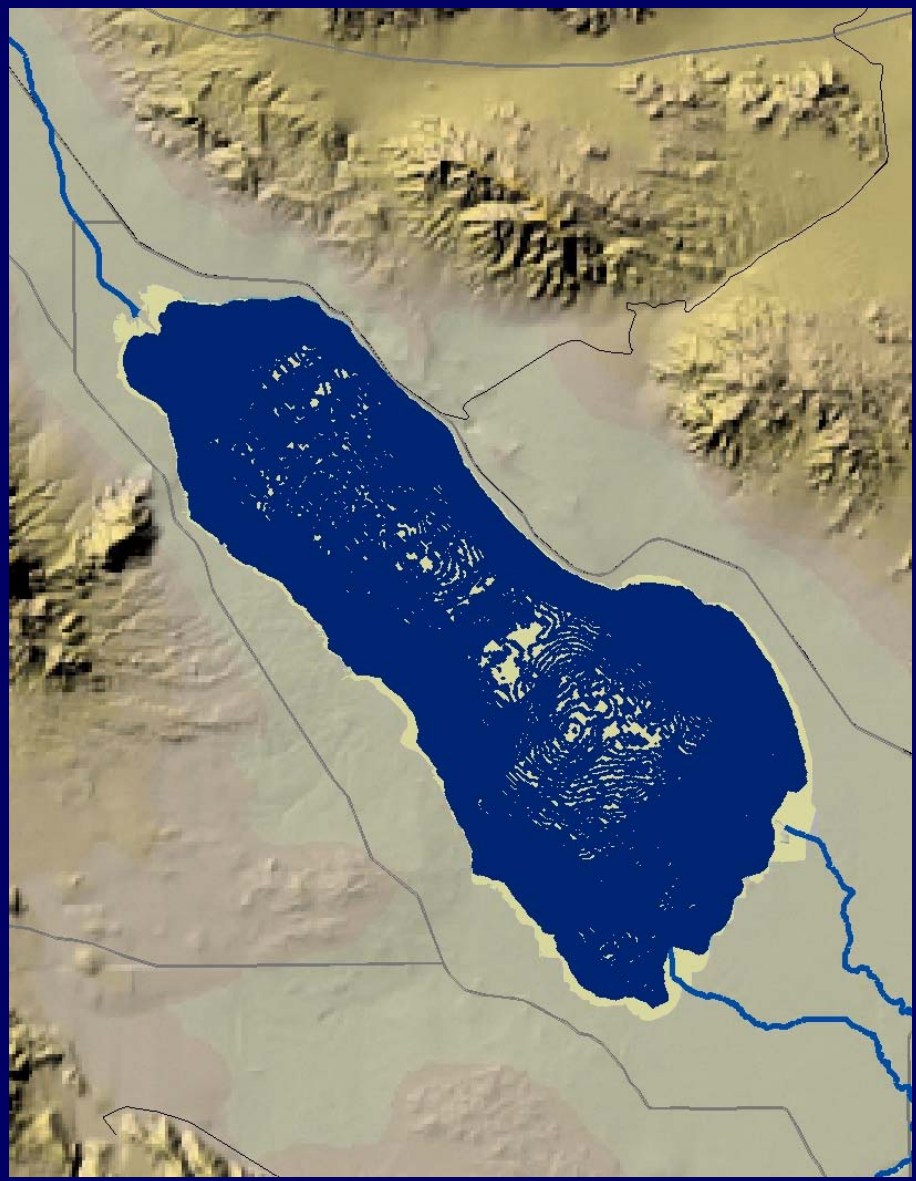
(Mean Stochastic Simulation Results)

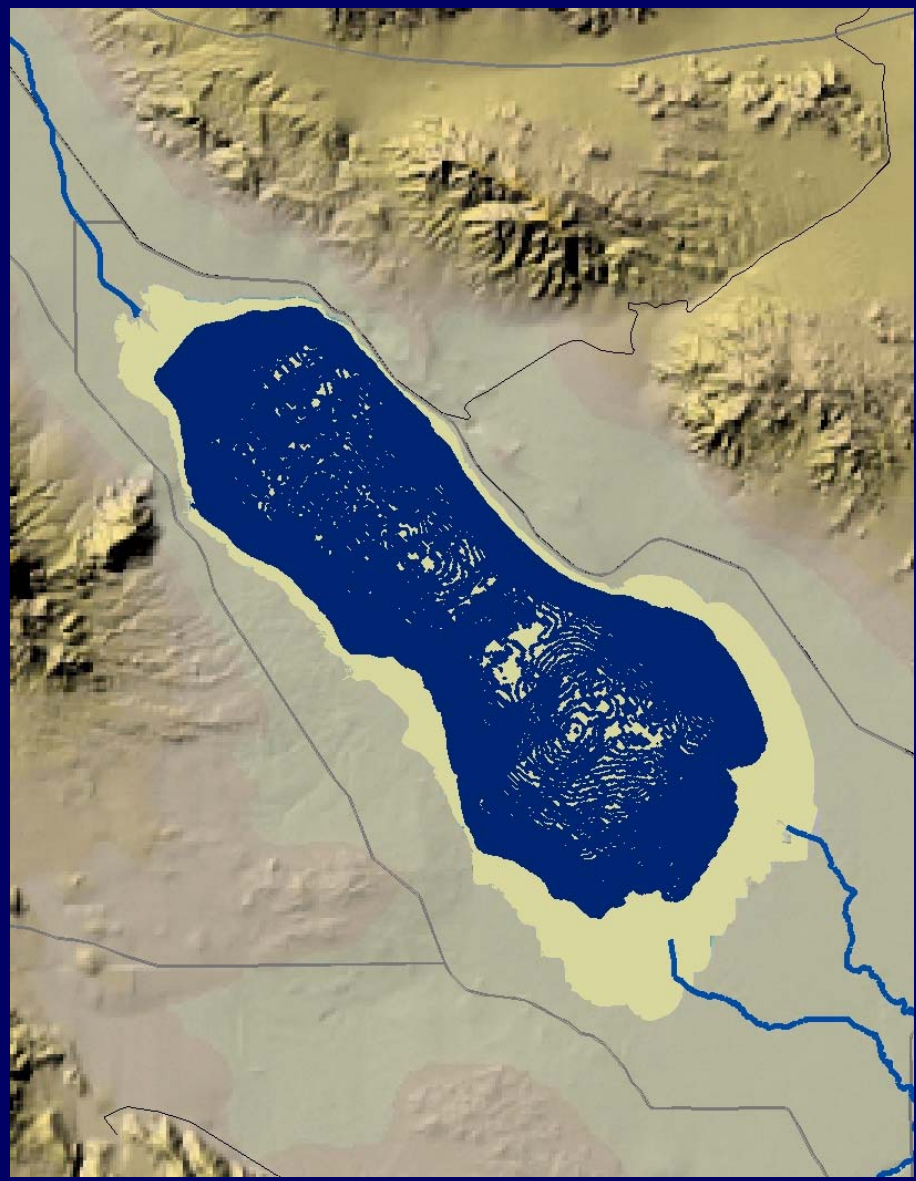


Future Salton Sea Baseline Water Surfaces

IID/SDCWA Baseline Min = -235 ft

QSA Baseline Min = -249 ft





Assumptions to be Considered for Salton Sea Ecosystem Restoration No-Action Alternative

- Changes in inflow from Mexico
- IID / DWR / MWD Transfer
  - Less than 1.6 maf total
- Consumptive use in New and Alamo River Wetlands
- Changes in cropping patterns
- Drought / climate change

IID / DWR / MWD Transfer

Fish and Game Code 2081.7 (c)(1) and (c)(2)

QSA Agreement Year	Calendar Year	(c)(1) Salton Sea Restoration Increment (kaf)	(c)(2) Salton Sea Mitigation Increment (kaf)	Total (kaf)
1	2003	0	5	5
2	2004	0	10	10
3	2005	0	15	15
4	2006	0	20	20
5	2007	0	25	25
6	2008	20	25	45
7	2009	40	30	70
8	2010	60	35	95
9	2011	80	40	120
10	2012	100	45	145
11	2013	100	70	170
12	2014	100	90	190
13	2015	100	110	210
14	2016	100	130	230
15	2017	100	150	250
	TOTAL	**800**	**800**	**1600**

Assumptions to be Considered for Salton Sea Ecosystem Restoration No-Action Alternative

- Changes in inflow from Mexico
- IID / DWR / MWD Transfer
  - Less than 1.6 maf total
- Consumptive use in New and Alamo River Wetlands
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